DPH41/GPH41 — SPECTROSCOPY

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define start effect.

2. "Molecules having permanent dipole moment are microwave active and those not having permanent dipole moment are microwave inactive". Comment.

3. What do you understand about the Normal mode of vibrations?

4. Mention the advantages of ATR technique.

5. What is the principle of Raman spectroscopy?

6. Outline the advantages of using laser as Raman source.

7. What is the basic principle of UV spectroscopy?

8. What do you understand about selection rules in UV spectroscopy?

9. Define chemical shift in NMR spectroscopy

10. List applications of ESR spectroscopy.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Discuss microwave spectra for linear polyatomic molecules.

Or

(b) Construct the microwave spectrometer with a block diagram and explain its function.

12. (a) Explain the principle of FTIR spectroscopy.

Or

(b) Analyze normal modes of vibrations of H_2O molecules.

13. (a) Explain quantum theory of Raman scattering.

Or

(b) Describe in detail on the vibrational Raman spectra of molecules.

14. (a) Write down the applications of UV spectroscopy.

Or

(b) Discuss the molecular orbital theory of UV spectra.

15. (a) Explain the construction and working of NMR spectrometer with block diagram.

Or

(b) Explain the principle AAS and working of single beam spectrophotometer.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elaborate the theory of interaction of radiation with rotating molecules and explain the rotational spectra of rigid diatomic molecules.

17. Discuss the working principle of an IR spectrometer with a neat diagram. Tell about sample handling techniques.

18. Draw a schematic diagram of the Raman spectrometer and explain different pans of the spectrometer.

19. Explain Franck Condon principle and hence discuss the electronic transitions in molecules.

20. Describe the theory of Mossbauer spectroscopy along with experimental techniques.

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